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AIR TRAINING CORPS

**SYLLABUS of TRAINING**  
(PROVISIONAL)

This handbook is issued for the information  
and guidance of Officers and Instructors of  
the Air Training Corps.

Issued from H.Q., Air Training Corps.  
"Montrose," Stanmore, Middlesex.

# FOREWORD

BY

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COMMANDANT, AIR TRAINING CORPS.

TO THE OFFICERS AND CIVILIAN INSTRUCTORS,

AIR TRAINING CORPS.

We are all engaged on very vital work, since the success or failure of our efforts will have important results on the efficiency of the Royal Air Force this winter and thereafter.

First of all we need the Aircrews and we want every young man with the guts and physique to be given the chance to prepare for this work. If his Mathematics and English are deficient, his keenness and attendance at classes which your Education Authorities will arrange should give him enough knowledge to go through the course with credit.

Only less urgently do we need the technical tradesmen. Here we should endeavour to select the courses which we can best teach and for which the cadet is best suited, so that we can start him on the right road to become a skilled tradesman.

The calls on your tact, your patience, your time and your enthusiasm will be heavy. I am sure that you will meet these calls, and I thank you for your services.

J. A. C.



## GENERAL.

The object of the Air Training Corps is to gather together the best of the youth of this country, and to equip them in character, body and mind for entry into the Royal Air Force.

No cause has ever been more worthy—no object ever fraught with greater potentialities. The scheme is planned on the widest democratic principles and calls to those who are best equipped to undertake the work to mould the character of our youths at a plastic age, to decide from observation and tests the branch of the Royal Air Force which they can most usefully serve, and to instruct them technically and practically for the selected branches, so that they can enter the R.A.F. as semi-skilled and handpicked men either voluntarily or when called for service.

Whilst it is the *primary* purpose of the Air Training Corps to provide basic training for prospective candidates for the Royal Air Force and Fleet Air Arm it has also been agreed that prospective candidates for the Royal Navy may join.

The syllabuses of training are laid down in this handbook, but it cannot be over emphasised how much depends upon the enthusiasm and effort of the officers and instructors of each unit. It must always be remembered that youth must be enthused, that colour must be embodied into the instruction, and that every effort and artifice should be employed to engender and maintain the utmost keenness.

Talks should be interspersed between lectures with the object of giving Cadets an enthusiastic R.A.F. background. Every effort should be made to "humanise" the instruction so that the Cadet may realise that a knowledge of Mathematics is not merely an educational asset but a vital essential to the future Airman or Aircraftman.

## CLASSIFICATION.

As specialisation is of the utmost importance Cadets should be selected at the earliest opportunity for :—

1. Air Crews.
2. Ground Crews.

Notes on the method of selection for various courses are given at the beginning of Parts II and III of this guide, but it is suggested that a general examination paper be attempted by all Cadets. This paper should be graduated commencing from Elementary questions and advancing to School Certificate standard. The paper should include questions to test the Cadet's Mathematical knowledge, General Intelligence, and ability to write concise and logical English. A suggested test paper may be obtained on application to Officer i/c Training.

This handbook has been divided into three Sections :—

- Part I—Administration (*All Cadets*).
- Part II—Initial Training Wing (*Air Crews only*).
- Part III—Trades (*Ground Duties*).

All Cadets will study subjects under the heading of "Administration and Organisation" with the object of obtaining R.A.F. background and atmosphere and familiarising themselves with broad R.A.F. Organisation.

As Cadets will have to attend local technical schools and workshops for a considerable amount of the required instruction, it is recommended that they should meet at least once each week at Unit Headquarters in order to encourage the "get together" spirit. It is at these times that lectures should be given in the subjects of Part I (General Administration and Organisation) which are common to all Cadets.

Cadets selected for *Air Crews* will study the subjects included in the Initial Training Wing Syllabus (Part II) while those selected for Ground

Duties will study the subjects in the syllabus covering the selected trade (Part III).

In classifying Cadets into groups and arranging for instruction, it should be borne in mind that it is desirable to obtain as many suitable Air Crew entries as possible. Certain trades are also of more importance than others. The following is the order of precedence :—

- |                             |   |                      |
|-----------------------------|---|----------------------|
| 1. Initial Training Wing    | } <i>Those training as Pilots<br/>or Observers.</i> } | <i>Air<br/>Crew.</i> |
| 2. Wireless Operator        |   |                      |
| 3. Wireless Operator        | —Air.   |                      |
| 4. Wireless Mechanic.       | —Ground.  |                      |
| 5. Radio Mechanics.         |   |                      |
| 6. Flight Mechanics E.      |   |                      |
| 7. Flight Mechanics A.      |   |                      |
| 8. Instrument Repairers II. |   |                      |
| 9. Electricians II.         |   |                      |
| 10. M.T. Mechanics II.      |   |                      |

The syllabuses to be followed are those of the Royal Air Force Courses, but for the Air Training Corps the training will normally be spread over a period of approximately one to two years *dependent upon the age of the Cadet*. While it is the object of the Air Training Corps to make available as many semi-skilled men of the right character at the age of eighteen years, it must be remembered that Cadets who pass the age of 18 years are eligible to continue as members of the Corps, until such time as they are called up for Air Force or Naval service, and that while cadets may attest at the age of 17½ years provided they have passed the appropriate tests such men will be placed on deferred service and will not be called up for Air Force Training earlier than would otherwise be the case.

Further, men over 18 who are *attested* candidates for Air Force service may receive technical instruction with the Air Training Corps where they can be accommodated.

For the foregoing reasons, *flexibility of instruction must be arrived at*.

The help of the Area Controller, the local Committees and local R.A.F. Units should be drawn upon fully so that properly trained and *interested* instructors are obtained.

It should be noted that educational establishments are often qualified, properly equipped and willing to assist, not merely in bringing Cadets up to the necessary educational standard, but also by undertaking specialised training.

Attendance at Local Schools or Workshops for instruction, apart from attendance at Unit Headquarters, will be credited to Cadets as official hours of attendance.

#### GROUPING OF CADETS.

Having classified the Cadets in two main divisions (Air Crew or Ground Duties) according to the branch of the Royal Air Force which they can most usefully serve, the cadets in each division should be "vetted" and classes carefully made up so that the cadets of higher intelligence are not held back, and perhaps still more important, so that the less educated Cadets or slower thinkers (who eventually often become extremely competent and reliable workers) are not rushed, and their training time wasted by failing to give them the sound foundation that is called for. In forming classes or squads and flights the varying circumstances of the Cadets should be borne in mind and no effort should be spared to encourage them to be good "mixers." With this end in view



groups should be made up of Cadets from different types of homes and schools so that cliques and snobbery may be avoided.

#### LECTURES.

Lectures should be made as interesting and comprehensive as possible, they should not be stereotyped but should be prepared in such a way that they encourage the Cadets to think for themselves to reason constructively, and to ask questions. Any question, however pointless, must be dealt with seriously and sympathetically by the instructor. A laugh at the expense of a youth's ignorance can do much harm to the youth and to the Air Training Corps.

Continuity must be maintained, and for this reason syllabuses should be strictly followed. In this connection the co-operation of the Cadets must be obtained to ensure that they do not absent themselves from lectures or practical work. It is suggested that "attendance marks" should be given which should be taken into account in "Section efficiency Competitions," which should be planned and encouraged.

#### TEXT BOOKS.

Arrangements have been made for the *direct* supply of Text Books to all Squadrons. *Applications from Squadrons for literature will be unnecessary.*

#### NOTE TAKING.

Cadets should be encouraged to write up notes in their spare time, but the mere dictation of notes to Cadets is to be avoided. *Dictation should only be resorted to when the exact wording of a definition is essential.*

#### PERIODICAL EXAMINATION.

It is recommended that training should be divided into stages and that Cadets should be examined at the completion of each stage so that instructors may be satisfied that candidates have a thorough grasp of the work already covered before proceeding to the next stage. Cadets who show weakness in any subject should be sympathetically encouraged and given special assistance in overcoming weaknesses.

#### FINAL EXAMINATION.

At the end of the course, Cadets taking trade courses will be examined by the Central Trade Test Board so that they may be mustered directly to their trades.

#### MAINTAINING ENTHUSIASM.

All Cadets passing proficiency Tests will become Leading Cadets and will be issued with distinguishing badges, but apart from this, all means should be taken to encourage keenness between Cadets, and particularly between Sections and Flights, to bring out the team spirit. Where possible Inter-section Efficiency Cups or Shields should be introduced.

#### AUXILIARY LECTURES.

In addition to the organised curriculum, lectures by R.A.F. Officers or other experts on any subject likely to be of interest and assistance to the cadets should be encouraged, particularly in so far as such lectures might tend to relieve the monotony of a set course and maintain enthusiasm. First Aid, Photography, A.R.P., and subjects of more general interest such as History and Tradition of the Service, experiences of Pilots and others during the present war, could all be most usefully included.

16 m.m. films of an interesting and instructive nature are being produced. Allocation of films to Squadrons will be made by Head-

quarters, and it will not be necessary for Squadrons to make application until such time that they are notified that a film library has been organised to control distribution.

#### MEDICAL.

The Officer Commanding each Squadron is expected to satisfy himself that by the time the Cadet reaches the age of entry into the Service he will have a reasonable chance of satisfying the high medical standard required. When any doubt in the matter exists the Cadet should be examined by the Hon. Medical Officer to the Unit.

#### THE IMPORTANCE OF DIRECTION.

The successful organisation and operation of the A.T.C. Units depends very largely upon the Committee, Officers and Instructors. Their task is a difficult one, calling for hard and sustained effort and a high order of initiative, enthusiasm, vision and understanding of youth. It is these attributes that Officers are asked to bring to bear in the knowledge that in no field of national effort could they play a finer part than in preparing the youth of this country for the honour of wearing the uniform of the Royal Air Force.



### 'SUMMARY OF SYLLABUS OF TRAINING.

## ADMINISTRATION AND GENERAL TRAINING.

1. (a) Royal Air Force Administration and Organisation. Hygiene, Uniform, Ranks, Office Organisation, Welfare of Airmen, Conditions of Service, General Organisation, Stations and Units, Duties, Law and Discipline. Powers of Commanding Officers.  
(b) Drill (without arms)      { As for I.T.W. }  
(c) Physical Training            { syllabus, *see* }  
(d) Aircraft Recognition       { pages 25, 26 & 27 }

## TECHNICAL TRAINING.

2. *Air Crew* { Initial Training Wing      Pilots.  
                             "                                "      Observers.  
                             Wireless Operators      Air. }

- ### 3. *Ground Duties.*

Wireless Operators. Ground.

## Wireless Mechanics.

## Radio Mechanics.

Flight Mechanics (E.) and Air Mechanics (E.) (R.N.)

Flight Mechanics (A.)

## Instrument Repairers II

Electricians II

M.T. Mechanics II

The above are listed in order of importance and requirements for personnel.

### ADDITIONAL SUBJECTS AND ACTIVITIES.

## Model Aeroplane Making

(a) Flying Models.

(b) Scale Models for recognition purpose.

## Photography.

## Athletics.

## Boxing.

Swimming.

## First Aid.

Gas.

A.R.P.

Lectures by R.A.F. Officers and other experts in various branches of the Service or on allied subjects.





## SYLLABUS OF TRAINING.

### PART I.

#### ADMINISTRATION—ORGANISATION.

Lectures covering the following syllabus will be given to all Cadets. It is recommended that these lectures should be interspersed between technical or practical instruction as a mental relaxation from more exacting study.

NOTE.—*K.R. & A.C.I. also M. of A.F.L. are quoted as references but at present are not available for distribution. Should these become available later they will be issued directly to squadron and no applications will be necessary.*

Lecture	Subject	Appropriate Books
1.	ADMINISTRATION AND ORGANISATION. Discipline. What it means. The importance of and the necessity for obedience.	Lecture Notes. Rules & Regulations. K.R. & A.C.I. A.P. 1081. Pocket Book.
2.	Aim and object of the Air Training Corps and organisation.	
3.	Morale. Esprit de Corps and Physical Fitness.	A.M.P. 105.
4	The Air Force Act. All ranks subject to in addition to responsibilities as citizens.	
5	Ranks and Badges of the R.A.F. R.A.F. organisation.	
6	Relative Ranks. R.N., Army and R.A.F.	A.P. 1081. Chap. VII. Para. 413.
7	The R.A.F. as a Career. Life in the Service.	
8*	PERSONAL HYGIENE. (i) Disease and its prevention. (ii) Alcohol and Tobacco. (iii) Games and Physical Training. (iv) Accommodation and Sanitation.	A.P. 1081. Sec. XIV. 74. Omit paras. 965 to 968. A.P. 1081. Sec. 54.
9.	UNIFORM. (i) General Instructions relating to Uniforms of Officers and Cadets (ii) Care and maintenance. (iii) Authorisation to wear.	See A.T.C. Rules and Regulations.
10	RANKS & SENIORITY. <i>Duties :—</i> (a) Adjutant's Duties. (b) Orderly Officer's Duties. (c) Confidential Orders for Officers. (d) Standing Orders. (e) Unit Orders (Routine Orders). (f) Personal Occurrence Reports. (g) Air Ministry Orders. (h) Mess Etiquette Brief description of each subject ; how orders are issued ; subjects dealt with in orders ; where a copy of orders may be found.	K.R. & A.C.I. A.P. 1081. Instructional letter from H.Q.A.T.C.
11	OFFICE ORGANISATION. (a) Brief description of filing system. Method of dealing with files. (b) Writing official letters ; memoranda ; signals and minutes. (c) Treatment of Secret and Confidential correspondence. * To be given by Medical Officers.	As detailed in A.P. 947. Instructional letter from H.Q.A.T.C.



Lecture	Subject.	Appropriate Books.
	(d) Orderly Room procedure. (e) Outline of H.Q. organisation for dealing with correspondence.	
12	WELFARE OF AIRMEN. (a) Barrack and Kit inspections. (b) Effect of discipline generally. (c) Airmen's Messing. (d) Accommodation. (e) Organized Games. (f) Library.	Special Notes. K.R. & A.C.I. A.P. 1081. H.Q.A.T.C. instructional letter.
13	CONDITIONS OF SERVICE—AIRMEN. (a) Airmen's Trades and Groups. (b) Reclassification. (c) Promotion. (d) Remustering. (e) Discharge. (f) Complaints : applications.	See letter on Admin. Notes. K.R. & A.C.I. A.P. 1081. A.M.Os.
14	GENERAL ORGANISATION OF THE ROYAL AIR FORCE. (a) Air Ministry. (b) Commands. (c) Groups. (d) Stations. (e) Wings, Squadrons and Flights ; Composition and functions ; chain of operations. (f) Officers; G.D.-V.R. Equipment. Medical. Administrative. Accounts. Dental. Engineering. Specialist Branches. This is to be dealt with on broad lines only.	K.R. & A.C.I. A.P. 1081. H.Q.A.T.C. letter.
15	STATION AND UNIT ORGANISATION.	
16	DUTIES OF OFFICERS.	K.R. & A.C.I. See H.Q. A.T.C. Instructional letter. Rules and Regulations.
	PART II.	
1	LAW & DISCIPLINE. (a) Discipline. (b) Parades. (c) Orders. (d) Saluting ; brief history ; reasons for method. (e) Avoidance of undue familiarity (Airmen). (f) Service customs.	A.P. 804. Manual of Air Force Law. A.P. 1081. Special Notes.
2	AIR FORCE LAW. (a) Brief description of Manual.	A.P. 804.

Lecture	Subject.	Appropriate Books.
	<ul style="list-style-type: none"> <li>(b) The Air Force Act. (All ranks subject to in addition to responsibilities as a citizen).</li> <li>(c) Official Secrets Act.</li> <li>(d) King's Regulations. What they are. Their application in relation to the Air Force Act.</li> <li>(e) Explanations of Sections 4-44 of Air Force Act.</li> <li>(f) Extracts from K.R. &amp; A.C.I. applicable to all ranks.</li> <li>(g) Relation of Officers and Airmen to civil life.</li> </ul>	<p>M. of A.F.L.</p> <p>F. 520.</p> <p>M. of A.F.L. K.R. &amp; A.C.I.</p> <p>Copy of Sections 4-44, A.F.A.</p> <p>A.P. 1621. Paras 32-40.</p> <p>M. of A.F.L. Chap. VIII.</p>
3	<p>POWERS OF COMMANDING OFFICERS.</p> <ul style="list-style-type: none"> <li>(a) Subordinate Commanders.</li> <li>(b) Detachment Commanders.</li> <li>(c) Executions of Punishments.</li> <li>(d) Evidence.</li> <li>(e) Arrest and Custody.</li> <li>(f) Investigation of Charges. (Investigation; Courts of Enquiry; Summaries of Evidence; Courts Martial.)</li> </ul>	<p>K.R. &amp; A.C.I.</p> <p>M. of A.F.L.</p> <p>Special Notes are being issued on <b>Law</b> and discipline.</p>
4	<p>SERIOUSNESS FROM SERVICE POINT OF VIEW.</p> <ul style="list-style-type: none"> <li>(a) Scandalous Conduct.</li> <li>(b) Offences involving Low Flying.</li> <li>(c) Offences involving serviceability, loss or destruction of aircraft.</li> <li>(d) Mutiny and insubordination.</li> <li>(e) Desertion; fraudulent enlistment and absence without leave.</li> <li>(f) Drunkenness.</li> <li>(g) Permitting the escape of persons in custody.</li> <li>(h) Corrupt dealings in respect of supplies to the Forces.</li> <li>(i) Deficiencies in and injury to equipment.</li> <li>(j) Falsifying Official Documents; False Declarations.</li> <li>(k) Neglect to report and Signing in blank.</li> <li>(l) False accusation and False Statement.</li> <li>(m) Offences in relation to enlistment.</li> <li>(n) Injurious Disclosures.</li> <li>(o) Conduct to prejudice of Discipline.</li> </ul>	
5	<p>REDRESS OF GRIEVANCES.</p> <ul style="list-style-type: none"> <li>(a) Officers.</li> <li>(b) Airmen.</li> <li>(c) Mode of Complaint.</li> </ul>	

## PART II.

### INITIAL TRAINING WING.

(For Air Crews.)

A Cadet taking this course should have reached a good educational standard in the essential subjects before commencing his training for Air Crew Duties. When it is found that a cadet is suitable from all other standards but is educationally unfitted for the course, arrangements should be made to bring him to the required educational standard by instruction at some local school or college.

It should be established that by the time the cadet reaches the age for entry into the R.A.F. he will have a reasonable chance of satisfying the high medical standards laid down.

In this connection it should be borne in mind that colour-blindness is a bar to Air Crew Duties.

The qualifications expected of cadets for Air Crew duties are :—

#### GENERAL.

Character and the aggressive spirit in games.  
Sound physique.  
Good Education.

#### CHARACTER, ETC.

For the qualifications under this heading it is impossible to give more than a general guide. The qualities looked for are courage and determination, alertness and keenness, coolness, initiative and a sense of responsibility. It should be established that the candidate has a strong interest in flying and a real and definite desire to fly and fight in the air. Consideration is given to general bearing and appearance, as well as to the candidate's school career, with particular regard to O.T.C. and cadet service, positions of leadership in school life and games, as well as to his subsequent civil occupation.

#### PHYSICAL STANDARD.

Physical fitness is determined by medical examination, but attention is paid to general physical habits, turnouts, tidiness, etc. As regards games played, stress is laid on those of a strenuous nature, e.g. football, boxing, long distance running, which require moral and physical stamina.

#### EDUCATION.

~~The standard of education of a candidate for Air Crew employment should be up to that of the School Certificate A or School Certificate B standard by the time he proceeds to his E.F.T.S. or A.O.N.S.~~

~~A sound knowledge of elementary mathematics (including logarithms and trigonometry) is essential. Candidates who are not up to standard on entry may however be brought up to standard while they are Cadets. Their attendance at evening classes, etc., may in this event be counted as a "parade" in assessing efficiency.~~



*Syllabus for those cadets of the A.T.C. found to be suitable medically and educationally to proceed to an Initial Training Wing for training as Pilots or Observers upon reaching the required age.*

Instruction should be given in :—

1. Mathematics.
2. Navigation.
3. Signals.
4. Recognition of Aircraft.
5. Drill.
6. Physical Training.
7. Anti-gas Training.
8. Armament.
9. Law and Administration.

(Note for A.T.C. Officers supervising this syllabus) A.P. 1388, 6th Edition, July, 1940, lays down and co-ordinates the various stages of training of Air Crews of the Royal Air Force.

A.P. 1388, delegates training of Pilots and/or Observers at Initial Training Wings in priority as follows :—

(i) To develop the physical fitness, morale and leadership of cadets and to provide information as to the degree in which individual cadets possess the characteristics required of air crew personnel.

(ii) To provide essential instruction in ground work which will be dealt with in more detail during later stages of training. This ground work must be inculcated with the greatest thoroughness to ensure sound foundations for later training.

(iii) Eliminate those cadets who fail to reach the standards required.

(iv) Assess and report upon the capabilities and potentialities of cadets with a view to their becoming Officers later in their service.

Briefly, an A.T.C. Cadet passing to a R.A.F. Initial Training Wing will be, upon reaching an I.T.W. :—

- (a) Disciplined mentally and physically.
- (b) Thoroughly grounded in all subjects of the Syllabus.
- (c) Reported upon as to suitability to become an Officer.
- (d) Re-mustered to another trade or given the opportunity to apply for duty as an air gunner, if unable to make the grade educationally as a Pilot or Observer.

After the required period at a Royal Air Force Initial Training Wing (at present 8 weeks), those cadets who have attained the required standard in the examinations, will be posted to an Elementary Flying Training School (E.F.T.S.) or an Air Observer Navigation School (A.O.N.S.) according to their application, on entry, to become a Pilot or Observer.

It should be emphasised, however, that the objects of training set out above, particularly with regard to re-mustering to another trade in the event of failure in examinations, applies only to cadets who have entered an Initial Training Wing. Consequently, an A.T.C. Cadet can continue his studies right up to the age when he is eligible to apply for entry to an I.T.W.

### Mathematics—Purpose of.

1. The Syllabus of Mathematics has these definite aims in view :—
  - (i) To revise the mathematical work which the cadet performed at his school(s).
  - (ii) To ensure a certain proficiency in mathematics essential for the study of Air Navigation.
  - (iii) To bring about the mental alertness requisite for a successful grasp of subsequent training in ground instruction.

### Mathematics—Syllabus.

#### 1. ARITHMETIC.

Vulgar Fractions.  
Problems.  
Decimal Fractions,  
Conversion to Vulgar Fractions and  
*vice versa*. Problems involving applic-  
ation of decimals to concrete quan-  
tities.  
Units of Length—Statute Nautical.  
Metric Conversion.  
Averages.  
Ratio and Proportion.  
Percentages.  
Square Root.  
Problems involving sides of right-  
angled triangles.

#### Reference.

Any Standard text-  
book on Elementary  
Mathematics.

#### 2. ALGEBRA.

Use of Symbols.  
Substitution and transposition of  
formulas.  
Simple graphs.  
Co-ordinates.  
Scales.  
Interpretation of graphs.

#### 3. GEOMETRY.

Measurement of Angles.  
Vector and Scalar Velocities.  
Triangle of Velocities.

### Mathematics—Examination.

1. An examination will be held in Mathematics.
2. The minimum percentage required by any cadet in order to continue his training is 60.





## NAVIGATION—SYLLABUS.

	<i>Reference.</i>
1. Form of the Earth. Representation of meridians and parallels on maps and charts. Great Circle.	A.P. 1234 (1940) Edn. Chap. II, paras. 1 & 2. Fig. 5.
2. Latitude and longitude on the sphere and on maps and charts.	Chap. II, paras. 2 & 4. Chap. IV, para. 6.
3. Change of latitude and longitude.	Chap. II, paras. 3 & 5.
4. Variation. Methods of showing variation on maps and charts. True and magnetic directions.	Chap. II, paras. 9 & 11.
5. Deviation. Forms 316 & 316A. Interpolation. Magnetic and compass directions.	Chap. II, paras. 12-20.
6. Bearings. Courses and tracks; laying down on maps and charts. True magnetic and compass directions.	Chap. II, paras. 6-8. and 16-20. Chap. III, para. 27.
7. Maps. Scale, relief and conventional signs. The maps used in navigation.	Chap. III, paras. 1, 2 & 7-14, Chap. V.
8. Charts, Rhumb Line, Outline of proportion of Horcators projection. Scale, distance and hearings. Convention signs.	Chap. II, para. 22. Chap. IV, paras. 1-5, 7, 13-17.
9. Methods of reporting position, bearing and distance and lettered co-ordinate systems.	Chap. III, paras. 15-19.
10. The Triangle of velocities applied to D.R. Navigation.	Chap. I, paras. 4-9.
11. To find the course to steer when wind velocity is known. (Plotting).	Chap. I, para. 10.
12. (a) To find velocity when course, airspeed, track, and ground speed are known. (Plotting). (b) To find the Track and ground speed when course, airspeed and wind velocity are known. (Plotting).	Chap. I, para. 11.
13. Map Reading. General principles. Practical exercises on the Map Reading Tutor. Identification of pin points from photographs.	Chap. III, paras. 30-40.
14. Time scales. Construction and use. (Each pupil to construct time scale for retention and later use in cross country flying).	Chap. I, para. 18.
15. The Magnetic Compass. Setting and reading courses on pilot's types. Behaviour of the compass during (a) turns from N. (b) turns from S. (c) changes in speed on Easterly and Westerly courses.	Chap. IX, paras. 1-3 and 16-24.
16. The Air Speed Indicator. Principles of construction. Correction for height by formula and computer. Position error.	Chap. VII, paras. 4-9.

*Reference.*

- |   |                                       |
|---|---------------------------------------|
| 17. The Altimeter. Principles of construction. Reasons for setting to zero or aerodrome height before flight. Lag. Correction by computer. Effects of pressure changes. | Chap. VII, paras. 13-20. and 51 & 52. |
| 18. Meteorology. Atmospheric pressure and temperature.  | Chap. XII, paras. 8, 9, 12 & 13.      |
| 19. Meteorology. The effects of variations of temperature and pressure on altimeter readings. Relation of wind and pressure.  | Chap. XII, paras. 10, 11, 14-16.      |
| 20. Meteorology. Variation of wind and height. Diurnal variation of wind. Local wind.   | Chap. XII, paras. 17 & 18, 20 & 21.   |

**Navigation—Examination.**

1. An examination will be held in Navigation.
2. The Minimum percentage required by any cadet in order to continue his training is 60%.

**Navigation—Failures in.**

1. A cadet who fails to obtain 60% is to be suspended from training but will be given an opportunity to apply for service as an Air Gunner, or for training in any other trade taught in the Royal Air Force.

**Accuracy in Navigation—Limitations.**

1. The following standards of accuracy are to be adhered to for all training and examination purposes :—
  - (i) Plotting work—Accuracy to the nearest whole degree.
  - (ii) Calculations—e.g. those involving annual changes of variation and/or interpolation for deviation—accuracy to the nearest half degree.

**Standard phraseology and requirements of questions.**

1. The following standards regarding phrasing and requirements of questions in Air Navigation in both training and Examinations are to be strictly complied with :—
  - (i) Where a distance is asked for or given in any question the standard unit or measurement required or given is at all times to be stated, e.g. 10' = 10 nautical miles : 10m. = 10 statute miles. Similarly speeds are to be given or asked for specifically in either knots or miles per hour.
  - (ii) All place names in answer to questions are to be given in BLOCK CAPITALS.
  - (iii) When questions regarding the lettered co-ordinate system of giving position are asked, the R.A.F. method will normally be assumed unless Naval method is specifically stated.

**Symbols in Navigation.**

1. The following symbols are only to be used for training in Air Navigation for True, Magnetic or Compass North :—



True North.



Magnetic North.



Compass North.

### Definitions.

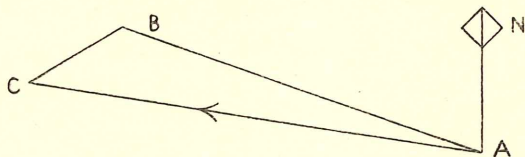
1. List of definitions are not to be issued to pupils.
2. Only those definitions applying directly to the instruction set out in the currency syllabus are to be taught.
3. Definitions should be explained during the course of the particular lecture to which they are applicable.

### Triangle of velocities—Solution.

1. The triangle of velocities appears both in the syllabus of Mathematics and Navigation. In teaching the solution of the triangle of velocities in the mathematics period attention should be given to the navigational aspects of the problem.

2. In solving the problem "To find the course to steer to make a desired track" the method shown in A.P. 1234, Chapter 1, paragraph 10, and figure 8 is only to be employed.

3. In solving the problem "To find the track and ground speed; course, airspeed and wind velocity being known," the method shown in A.P. 1234, Chapter 1, paragraph 12 and figure 10, is **not** to be employed. This will be taught as indicated in the diagram below :



N.A. represents the True Meridian. A.B. represents the course and air speed. A.C. represents the track and ground speed. B.C. represents the wind.





## SIGNALS—SYLLABUS.

1.

### Morse Buzzer.

First Period.	Memorising and translating Morse Code Symbols into sound.
Second & Third Period.	Reading Morse from open buzzer.
Fourth Period.	Reading Morse from open buzzer. Standard 2 w.p.m.
Sixth Period.	Buzzer instruction. Standard 3 w.p.m.
Eighth Period.	Buzzer instruction. Standard 4 w.p.m.
Tenth Period.	Buzzer instruction. Standard 5 w.p.m.
Twelfth Period.	Buzzer instruction. Standard 5 w.p.m.
Fourteenth Period.	Buzzer instruction. Standard 6 w.p.m.

Buzzer instruction should be given at least twice a week, and periods of instruction kept as short as possible, consistent with reaching maximum period allotted for each period.

Voluntary practice by pupils in their own time should be encouraged, and all practice buzzers should be obtained if possible with this object in view.

As pupils reach proficiency in any standard they should be transferred to the next higher standard.

Sending practice in buzzer should not be commenced until the fourth week.

Immediately pupils reach a standard of 6 w.p.m., they should be formed into a separate class and encouraged to improve on this speed.

It is essential that ALL pupils should reach a minimum standard of 6 w.p.m. before entering an Initial Training Wing for training as a Pilot or Observer, or proceeding to an E.F.T.S. or A.O.N.S.

2.

### Morse Lamp.

First Period.	Lamp signalling.
Second Period.	Lamp signalling.
Fourth Period.	Lamp signalling. Standard 2 w.p.m.
Sixth Period.	Lamp signalling. Standard 3 w.p.m.
Eighth Period.	Lamp signalling. Standard 4 w.p.m.
Tenth Period.	Lamp signalling. Standard 4 w.p.m.
Twelfth Period.	Lamp signalling. Standard 5 w.p.m.
Fourteenth Period.	Lamp signalling. Standard 6 w.p.m.

Voluntary practice by pupils in their own time should be encouraged where possible.

It is essential that ALL pupils should reach a minimum standard of 6 w.p.m. before entering an Initial Training Wing for Training as a Pilot or Observer, or proceeding to an E.F.T.S. or A.O.N.S.

### System of Training.

1. From the earliest stages of their instruction cadets should be taught to call letters by their phonetic equivalents, which are universal throughout the Services.

2. Morse should be taught by sound, as heard on a buzzer, e.g. dit dah dah dit. A few letters or figures should be taught at a time and remembered by their sounds.

3. Cadets should be taught to receive by buzzer in the first instance, and transmission should be made at 12 words to 15 words per minute, with the requisite intervals between letters or figures, according to the speed taught, until all signals are memorised. As the class gains speed the intervals can be shortened.

4. When the alphabet and numerals are sufficiently memorised by the cadets, the following punctuation and procedure signs should be taught :—

Beginning sign	<hr/> VE
Ending sign	<hr/> AR
Erase	..... (minimum of six dots).
Separative sign	.. ..
P/L Beginning sign	aaa
Code and numerals	<hr/>
beginning sign	BT

Instruction should be given in transmission by the Morse Key ; and from this stage any period of instruction should be divided between transmission and reception. The early stages of transmission should always take place under the supervision of the Instructor, in order that correct manipulation is taught. Later the cadet can increase speed individually as necessary.

6. In the early stages of instruction groups of five letters or figures should be employed, in preference to plain language, and letters should be written in block capitals, attention being paid to writing.

7. When the cadet has memorised all symbols and signs, plain language may be used, but should always be written in italics, and letters joined together to form words. This, in the early stages, assists the cadet to memorise a word and appreciate or follow the gist of the message being received.

8. At this stage, Visual signalling may be taught. Reception may be exercised by the use of a diffused light in the class room.

As the cadet becomes sufficiently confident the Aldis Lamp at a distance should be employed. All the examinations will be carried out by Aldis Lamp.

9. Aldis Lamp transmission may now begin. A simple method of instruction which has been proved to be successful is as follows :—

Three sheets of white paper, 9" x 7" are used. The first sheet has written on it one minute of plain language. Second sheet has written on it one minute of code. The third sheet 2 minutes of figures. These three sheets are pinned up at the end of a corridor, or other convenient place. The cadets are arranged at the maximum distance where the test sheets are still clearly visible when viewed through the telescopic sight. Cadets then send the tests, reading what they have to send through the telescopic sights from the sheets of paper. During examinations one complete letter transmitted out of focus counts as one mistake. The advantages of this method are as follows :—

- The cadet must keep the lamp focussed on the paper as he can only see what he has to send by viewing it through the telescopic sight.
- The cadet can observe the flashing of his own sending on the sheet, and this is of great assistance in helping cadets to learn quickly.



Where three Aldis Lamps are available, three sets of papers are pinned up and three cadets employed.

10. As soon as cadets can read and transmit at a moderate rate, plain language should be used, and the pupil encouraged to memorise words, and later, short sentences, such as short words of command, etc,

11. Finally, and due to the concentration necessary to learn Morse in the short period allowed, the cadet must be physically fit and alert. Individual instruction can be arranged out of class room periods.

### Examinations.

1. All cadets will be examined in the following :—
  - (i) Morse sending by Buzzer.
  - (ii) Morse receiving by Buzzer.
  - (iii) Morse sending by Aldis Lamp.
  - (iv) Morse receiving by Aldis Lamp.
2. The pass standard is 80% in each subject.
3. The rate of sending and receiving is to be at the rate of 6 words per minute on both Buzzer and Lamp.
4. Future tests on Receiving in Buzzer and Lamp will consist of one minute each on letters, figures and mixed groups, whilst two minutes with mixed letter figure groups will constitute a sending test.
5. The table below indicates how many of the various Morse signals are required to conform to one minute's signalling including separation sign between groups.

Rate.	Letters.	Figures.	Mixed Groups.
3 w.p.m.	13	10	11
4 "	15	13	14
5 "	20	16	18
6 "	25	20	22
7 "	29	23	26
8 "	33	26	30
9 "	38	30	34
12 "	50	40	45

Also a specimen test is provided herewith as a general guide. Aldis Lamp and Buzzer Receiving Tests at 6 words per minute. One minute each test.

SMHCX	75713	LQS2P
ALJMB	21386	7Q1V3
PFKAU	74309	RN615
TOZGW	10592	Y8JB4
QLEDV		F1

Lamp and Buzzer Sending test. Mixed Groups—2 minutes.

J4E86  
3FM7T  
WGZ25  
1J7T9  
U8AK5  
JP3B6  
7XH8L  
V4ZCI  
3J7V

The following tables are to be used for the assessment of cadets in compilation of the Passing Out Report.

Total number of mistakes.	Assessed %
Nil.	100
1	98
2	96
3	94
4	92
5	90
6	89
7	88
8	87
9	86
10	85
11	84
12	83
13	82
14	81
15	80
16	79
17	78
18	77
19	76
20	75
21	74

For each additional mistake delete " One " from assessment.

## RECOGNITION OF AIRCRAFT.

### SYLLABUS.

1. The Syllabus of Training in Aircraft Recognition comprises :—

- (i) British Aircraft.
- (ii) German Aircraft.
- (iii) Italian Aircraft.

2. A list of some of the aircraft which cadets are to be able to recognise, is given in paragraph 3 below :—

- |                              |                        |
|------------------------------|------------------------|
| 3. Albatross.                | Albacore.              |
| Anson.                       | Battle.                |
| Beaufighter.                 | Beaufort.              |
| Blenheim.                    | Blohm & Voss H.A. 139. |
| Blohm & Voss H.A. 140.       | Bombay.                |
| Botha.                       | Defiant.               |
| De Havilland Albatross.      | De Havilland Flamingo. |
| "    "    Tiger Moth.        | "    "    D.H. 86.B.   |
| "    "    D.H. 89.           | Dominie.               |
| "    "    Rapide or Dominie. | Dornier D.O. 17.       |
| Dornier D.O. 18.             | Dornier D.O. 24.       |
| "    D.O. 215.               | Ensign.                |
| Flamingo.                    | Focke Wulfe Condor.    |
| Fulmar.                      | Gladiator.             |
| Hampden.                     | Harvard.               |
| Heinkel H.E. 111.            | Heinkel H.E. 113.      |
| "    H.E. 115.               | Henley.                |
| Henschel H.S. 126.           | Hudson.                |
| Hurricane.                   | Junkers JU. 52.        |
| Junkers JU. 86.              | "    JU. 87.           |
| "    JU. 88.                 | "    JU. 90.           |
| Lerwick.                     | London.                |
| Lysander.                    | Magister.              |
| Master.                      | Messerschmitt ME. 109  |
| Messerschmitt ME. 110.       | Oxford.                |
| Rapide.                      | Roc.                   |
| Seafox.                      | Shark.                 |
| Skua.                        | Spitfire.              |
| Stranraer.                   | Sunderland.            |
| Swordfish.                   | Tiger Moth.            |
| Walrus.                      | Wellesley.             |
| Wellington.                  | Whirlwind.             |
| Whitley.                     | Fiat CR. 32.           |
| Fiat CR. 42.                 | Romeo RO. 37.          |
| Romeo RO. 37. Bis.           | Macchi. 200.           |
| Fiat G. 50.                  | Cant. Z. 501.          |
| Breda 65.                    | Cant. Z. 1007.         |
| Savoia SM. 79.               | Fiat BR. 20.           |
| Caproni CA. 310.             | Breda 88.              |
| Savoia SM. 85.               | Piaggio P. 32.         |
| Caproni CA. 312. Bis.        | Cant. 2. 506. B.       |
| Savoia SM. 81.               | Ghibli.                |



## EXAMINATION.

1. All cadets will be examined in this subject prior to proceeding to their Initial Training Wings. Examinations, which are to be organised under local arrangements, will be conducted in accordance with the following procedure.

2. The examination will consist of two parts :—

- (i) Part I. Written paper of half an hour—Total 50 marks.
- Part II. Recognition from photographs. 10 minutes.
- Total 50 marks.

3. (i) In part II each cadet is to be shown a chart containing twenty-five numbered photographs for a period of ten minutes, and is to write down the name of each.
- (ii) Two marks is to be given for each correct answer.
  - (iii) An answer is either right or wrong.
  - (iv) Pass marks are 60%.

4. The percentage in respect of both Parts I and II combined is to be entered in the appropriate column of the Passing Out Report in respect of each cadet. Where a cadet has failed in either Part I or Part II this fact is to be recorded in the remarks column of the Passing Out Report.

5. A “ Pass ” will be required in each part.

## FOOT DRILL.

### SYLLABUS.

Words of Command—Explanations, etc.	A.P.	818,	Part I.
Formation of a Squad.	Chap.	III,	Sect. 9
Numbering of a Squad	"	III,	" 14
Position of Attention.	"	III,	" 10
Standing at Ease.	"	III,	" 11
Standing Easy.	"	III,	" 12
Dressing a Squad.	"	III,	" 13
Words of Command.	"	II,	" 8
Opening and Closing a Squad.	"	III,	" 15
Turning when halted.	"	III,	" 16
Saluting.	"	III,	" 17
Dismissing a Squad.	"	III,	" 27
Length of pace and Time in Marching.	"	III,	" 18
Position in Marching.	"	III,	" 19
Marching in Quick and Slow Time.	"	III,	" 20
Change Step.	"	III,	" 21
Turning when on the March.	"	III,	" 24
Marching in double Time.	"	III,	" 22
The Side Step.	"	III,	" 23
Moving to a Flank Changing Direction.	"	III,	" 25
Movements of a Squad in Line.	"	III,	" 26
Cadets take Squads and exercise themselves in all Words of Command given in previous instruction, at the discretion of the Flight Commander.			

## PHYSICAL TRAINING.

### SYLLABUS.

<i>References.</i>			
War Office Tables. Free			
Standing Exercise, as			
used by all R.A.F. Units			
1. First Breathing Exercise.	P.T.	Table 1	
2. Second       "       "	"	"	2
3. Third       "       "	"	"	3
4. Fourth       "       "	"	"	4, 5
5. Fifth       "       "	"	"	6, 7
6. Sixth       "       "	"	"	8, 9
7. Sixth       "       "	"	"	10, 11
8. Sixth       "       "	"	"	12
9. Selected P.T. Game for each period.			

All R.A.F. Units are well supplied with qualified P.T. Instructors. The Commanding Officer of the R.A.F. Unit to which an A.T.C. Squadron is affiliated should be approached in the first instance and asked for his Co-operation. The tables are simple and pleasant to perform, it should be possible, therefore, to train a member of the Squadron to act as an instructor in a very short time.





## ANTI-GAS.

### SYLLABUS.

		<i>Reference.</i>
First Period.	The Respirator—Description, working, care, cleaning and disinfection.	A.P. 1510. Vol. 1, Paras. 38-42.
Second Period.	Respirator fitting—all three stages to be carried out.	„ 40.
Third Period.	War Gases — Description and effects.	„ 1 & 2, 43 (V).
Fourth Period.	Methods of Employment and detection.	„ „ „
Fifth Period.	Anti-Gas Clothing, Nos. 4 & 5, description, uses, how and by whom worn, and care of.	„ 8.
Sixth Period.	Respirator drill in relation to First Aid for Gas Casualties.	„ 11-16.
Seventh Period.	General action on Gas Defence Scheme, Signals, minimising of casualties, duties of sentries, etc. Gas Warning signals, Decontamination of arms and equipment.	45-60, para 9, sub-para (vi) (ix) and local orders re gas defence.
Eighth Period.	Respirator Drill.	A.M.O. A. 169/40.

### EXAMINATION.

1. Every cadet is to be examined in anti-Gas before proceeding to an Initial Training Wing.
2. The Pass Marks for this examination are 50%.



## SYLLABUS—ARMAMENT.

### VICKERS' GAS OPERATED GUN.

#### 1. *Vickers' Gas Operated Gun.*

- (i) General description of the Vickers' Gas Operated Gun.
- (ii) Mechanism.
- (iii) Stripping.
- (iv) Care and cleaning.
- (v) Assembly.
- (vi) General maintenance.
- (vii) Magazines.
- (viii) Loading and unloading.
- (ix) Stoppages.

2. Reference should be made to A.P. 1641B, Vol. I and II.

3. The Vickers Gas Operated Gun is the type used for instructional purposes at Initial Training Wings at present.

4. The standard to be aimed at is that the pupil is capable of stripping satisfactorily, cleaning, maintaining and assembling the gun. Detailed knowledge of the names of small parts is not required.

5. It is to be emphasised that this gun is merely a "Sample" of one of the several types of guns in use in the Royal Air Force and, provided its general principals are understood, pupils should have no difficulty in distinguishing between the difference between the other types of guns when they reach a more advanced stage.

6. It is fully realised that many A.T.C Squadrons will be unable to obtain the loan of a machine gun for instructional purposes. Consequently, the instruction in this subject will not be compulsory. If, however, it is possible to borrow any type of machine gun from local Units—Navy, Army, Home Guard or R.A.F.—the instruction made possible by such a loan would be of great help to those cadets who hope to pass into an Initial Training Wing or an E.F.T.S. or A.O.N.S. of the Royal Air Force, as the general principles of all guns are much the same.





### PART III

#### TECHNICAL TRAINING

#### GROUND DUTIES—TRADES.

The syllabuses to be followed are those of the Royal Air Force Courses, but for the Air Training Corps the training will be spread over a period of approximately one or two years, according to the age of the cadet.

The trades taught by the Squadron will depend largely on local circumstances, such as the type of cadet, local industries, and local facilities for training. If local circumstances do not permit the completion of the full practical instruction laid down in the syllabus, the work must be covered by lectures and visits to works or stations.

The trades are listed in order of importance and requirements for personnel :—

1. Wireless Operators—Ground.
2. Wireless Mechanics.
3. Radio Mechanics.
4. Flight Mechanics E.
5. Flight Mechanics A.
6. Instrument Repairer II.
7. Electricians II.
8. M.T. Mechanics II.

} Ground duties.

The abilities and potentialities of each cadet should be carefully reviewed at the time of his enrolment so that he may be utilised in the trade for which he is most suited. Cadets should attain a high medical category and be likely to pass the medical standard laid down by the Air Ministry.

The training should be of a high grade and it must be borne in mind that in order to obtain the proficiency grants, certain standards must be reached by examination, and with this end in view, it is our immediate concern to assist you in the training of the Air Cadets by supplying you with the necessary text books, publications and instructor's notes. Application for these should be made to Officer i/c Training, A.T.C. Headquarters.

Local conditions, such as facilities for instruction at or by the nearest R.A.F. Station, and the availability of other service or civilian instructors, will largely govern which trades may be selected, and before selection a close survey should be made of the ground to be covered by these courses.

Arrangements will be made to affiliate your Squadron to an R.A.F. Station if possible and contact should be made with the Commanding Officer of the R.A.F. Station so that in discussion with him, the facilities available in the way of training by the provision of service instructors, obsolete components, scrap materials, visits to the unit, etc., may be most effectively utilised.

It is equally important to contact Educational authorities, including Technical Schools, inviting their assistance for lectures to be given on that part of the syllabus not covered by the local R.A.F. Units.

The Educational authorities can be of great assistance in arranging evening classes. We have received assurance from them that they are prepared to co-operate in every possible way.

Industrial organisations can assist you with basic training and no doubt local authorities will also be ready to make arrangements for you in this way.

In addition to the instruction given by Officers, Squadrons may arrange for instruction in particular subjects, e.g. Anti-Gas, Armament, Physical Training, to be given by civilian instructors. Such services will normally be voluntary and unpaid but, in special cases only, Units may, with the authority of the Commanders, pay the expenses of such instruction.





## WIRELESS & RADIO MECHANICS—SYLLABUS

### MATHEMATICS.

*During the first half of the course.*

Revision of Arithmetic.  
Simple algebra leading to  
Formula, transposition, substitution,  
Simple graphs ; Interpolation,  
The Vernia.

*During the second half of course.*

Circuit—diagrams.  
The drawing and reading of Circuit  
diagrams, using I.E.E. Symbols.

### WORKSHOPS.

- (a) Soldering, filing and use of small tools. The cadet should be familiar with soft soldering and simple jointing work.
  - (b) Servicing of faulty Wireless components and assemblies in conjunction with blue prints or circuit diagrams.
- The cadet should have practice with test meters if possible.

### WIRELESS AND RADIO MECHANICS.

#### 1. SIGNALLING SYLLABUS.

Morse up to 12 words per minute and lamp up to 6 words per minute.

#### 2. WORKSHOP SYLLABUS.

Instruction in the use of simple tools such as drills, files, screwdrivers, etc., with practice in soft soldering.

Jointing wires and use of insulating tape, etc.

#### 3. TECHNICAL SYLLABUS.

Elementary D.C. & A.C. Theory.

Radio Theory.

Radio Practice.

Full use to be made of laboratory facilities for practice and demonstration.

4. The minimum time in which the course can be done is 6 months, but in most cases it will require a year's work. The technical syllabus is laid out in 26 sections, each representing at minimum a week's work, but on an average two weeks should be spent on each section. At least an hour a week should be devoted to theory and another hour a week to practical work.

5. Classes should not exceed 20 pupils.

6. Books recommended for study, in addition to A.P. 1762 :—

(a) *For all Students—*

“Foundations of Wireless.” Published by Iliffe & Sons.

(b) *For advanced Students only—*

“The Amateur Radio Handbook.” Published by the Incorporated Radio Society of Great Britain, 16, Ashridge Gardens, London, N.13.

Phase	THEORY	A.P. 1762 Pages	PRACTICAL
1	The structure of matter. Conductors and insulators. P.D. and how produced. Simple cells. Electric current. Units of measurement.	1—7	Examination of various types of cells. Activating of an inert cell. How to recharge a Leclanche cell. Examination of an accumulator. Cells in series and in parallel.
2	The simple circuit ; relation between P.D. and current. Ohms Law. Conductors in series and in parallel	10—17	How to recognise a discharged accumulator. “ Topping up ” recharging. Cells in series and in parallel. Use of voltmeter and ammeter.
3	The effects of a current— (a) heating—applications ; (b) chemical—electroplating acc. charging ; (c) magnetic—the electro magnet.	18, 22, 28 to 30	Precautions in making up circuits, good connections, etc. Simple soldering exercise (to be practised when- ever possible in later weeks).
4	Measuring Instruments— (a) Moving Iron ; (b) Hot Wire.	41—45	Finding the resistance of a conductor by volts- amps method. Use of potentiometer.
5	The Motor Principle— (a) Moving coil instruments ; (b) How a motor works ; (c) The Telephone Receiver.	33—36	Wheatstone Bridge experiment. Find the resistance of a lamp (a) hot, (b) cold.
6	Induced e.m.f. Faraday's experiments. The Dynamo principle.	45—46	Experiments to show how e.m.f. is provided by induction.

	Alternating e.m.f. Commutator.	52—53	Make a simple motor or dynamo.
7	Self induction. Nature of sparks on breaking contacts. Inductance. Mutual induction. Transformer.	49 51 86	Construct a simple transformer and couple it to the main A.C. supply if possible. Test voltage ratio.
8	Simple Electrostatics to the condenser. Types of condenser. Fixed and variable capacity condensers in series and in parallel. Capacity—units of measurement.	64—67	Examination of various types of Condenser. Making a simple condenser. Test for faulty condenser.
9	Capacity and Inductance. Oscillating circuit. Mechanical analogy. Radiation—damping. Frequency—wave length.	69 70 71—27	Experiments with A.C. Measuring instruments. Electrolytic effect. Magnetic effect. How to distinguish an A.C. from a D.C. main.
10	Elementary A.C. principles. Impedance and reactance. Resonance. Tuning circuit.	Selection Part 5 of Ch. VIII & Ch. IX.	Finding the impedance of a choke or condenser by volts-amps method.
11	Thermionic valves. Construction and action. Action of grid potential. The 3 functions of a valve.	101 to 104 108 to 110	Examination of valves. Plotting characteristics. Deducing valve constants.

Phase	THEORY	A.P. 1762 Pages	PRACTICAL
12	The triode as maintainer of oscillations in an L.C. circuit. Simple transmitter.	115	Set up oscillating valve and test frequency with a wave meter.
13	Types of radiation, CW, 1CW, R.T. Meaning of "modulator." Microphone.	134	Set up an oscillating valve with laying arrangement.
14	Valve as detector or demodulator. Study of the circuits for Anode Band and Leaky Grid detection.	96—97	Receive the radiation in a commercial receiver—send and receive Morse messages by W/T.
15	Valve as an amplifier (a) undistorted ; (b) distorted. Meaning of grid bias. Amplification factor.	143 148 150	Commence the building of a simple 3 valve receiver, general lay-out—the tuning circuits.
16	Low frequency amplification. Typical couplings.	112	The detector stage added. Listen in to broadcast with this simple detector. Add reaction—notice oscillation.
17	High frequency amplifier instability. Use of tetrode.	Parts of Ch. XII	The L.F. Amplifier stage, added precautions to avoid distortion.
18	Review of complete 3-valve receiver ; revision of the action of its components. Pentode output.	171 to 176	The H.F. stage added. Triode replaced by tetrode. Using the receiver in conjunction with simple home-made transmitter. Add a speech modulation stage to Transmitter.



19	Power supplier for W/T purposes. Rectifiers, single wave and double wave. Smoothing circuits. Motor generators.	Parts of Ch. XVI.	Fit up a mains rectifier. (valve or mains).
20	Aerials—simple receiving aerials. Transmitting aerials. Polar diagrams. Simple aerial array—lobes.	Ch. XV	Erection of an aerial with due respect to insulation, stability, etc.
21	The Loop Aerial. Directional Property. Simple explanation of D.F.	Ch. XV	Use a loop aerial to get a bearing on a transmitter.
22	Electro magnetic waves. Propagation in space ; velocity, skip distance and fading.		Commence construction of a simple M.O.P.A. transmitter. (ii) the frequency fixing circuits.
23	Limitation of simple Tx. The M.O.P.A. system. Crystal control.	179	M.O.P.A. ( <i>contd.</i> ) transmitter. The master oscillator circuit with screening, etc.
24	Back coupling in valves due to internal capacity neutralisation both in Tx and Receiver circuits.	182	M.O.P.A. ( <i>contd.</i> ). The power amplifier and neutralising circuit.
25	The Push-Pull circuit for purity amplification. Class B amplifier.	168 169	M.O.P.A. ( <i>contd.</i> ). The complete assembly with keying and modulation circuits.
26	Study of modulator waves, sidebands. Band-pass filter.	138 139 142	Sending and receiving messages on the complete 3-valve receiver and the M.O.P.A. transmitter.



## SYLLABUS.

### FLIGHT MECHANICS (E.) AND AIR MECHANICS (E.) R.N.

*To train Airmen and Naval Ratings to undertake minor routine inspections, cleaning, simple anti-corrosive treatment and simple adjustments on initial equipment, aircraft and engines.*

#### PHASE A. BASIC FITTING

LECTURES AND DEMONSTRATIONS BY INSTRUCTORS.

- 
- |           |   |
|-----------|---|
| PHASE A1. | Demonstration in care and use of Tools.<br>Use of marking out tools and methods of marking out. |
|-----------|---|
- 
- |           |  |
|-----------|--|
| PHASE A2. | Demonstration of marking out square hole from edge of plate. |
|-----------|--|
- 
- |           |  |
|-----------|--|
| PHASE A3. | Demonstration of finding centre of round bar with "V" blocks and scribing block ; marking out of squares around centres. |
|-----------|--|
- 
- |           |   |
|-----------|---|
| PHASE A4. | Types of drills and methods of drilling.<br>Cutting angles and lubricants.<br>Types of screw threads. Taps and dies.<br>Tapping sizes.<br>Fitting and removal of studs. |
|-----------|---|
- 
- |           |  |
|-----------|--|
| PHASE A5. | A.G.S. parts. Locking devices.<br>Use of spanners. |
|-----------|--|
- 
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|-----------|---|
| PHASE A6. | Brief description of metals commonly used in engine construction.<br>Causes of corrosion, detection of and methods of preventing corrosion. |
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| PHASE A7. | Hardening and tempering of Ferrous Metals.<br>Annealing and normalising duralumin.<br>Soldering and fluxes. |
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*Note:—Where equipment is not available Workshop practice is to be omitted and demonstration lectures are to be substituted.*

PHASE B. BASIC FITTING.	Practical Work	Lectures & Demonstrations by Instructors.	Books, References & Remarks.
PHASE B1.		Description of components and materials used in engine construction. Use of correct tools when dismantling engines and care of components.	
PHASE B2.	Dismantle Gypsy air cooled engines. Clean components. Lay out components for inspection. Each part to be carefully examined by each trainee and its function thoroughly understood.		
PHASE B3.		Description of operation of 4-stroke cycle, including function (but NOT operation) of magneto and carburetter. Function of valves, pistons, and sparking plugs. Simple technical terms, e.g. T.D.C., B.H.P., lbs/11", etc. Operation and speed ratio of camshaft. Simple timing diagram showing valve overlap, lead and lag, and reasons therefor.	
PHASE B4.	Assembly of engine up to point of valve timing.		
PHASE B5.		Methods of finding accurate T.D.C. Valve timing. Necessity for tappet clearances. Method of timing and synchronising magnetos. Function of ignition switches	
PHASE B6.	Valve and magneto timing and tappet adjustment.		
PHASE B7.		Methods of engine cooling and coolants used. Coolant circulation. Lubrication systems and care to be observed in their assembly. Types of oil pumps.	
PHASE B8.	Complete assembly engine.		
PHASE B9.		Dissertation on parts of engine most subject to wear. Brief explanation of tolerances and clearances. Description of the effects and symptoms of wear. Components likely to suffer.	



BASIC FITTING.	Practical Work.	Lectures & Demonstrations by Instructors.	Books, References & Remarks.
PHASE B10.	Dismantle engine as far as removal of cylinders and pistons and removal of valves. Examination of all parts for wear, including damage to valves and valve seats.		
PHASE B11.		Methods of testing valve springs and lapping in valves. Necessity for piston ring clearances. Method of fitting and gapping new rings.	
PHASE B12.	Lap-in valves and test tension of valve springs. Remove piston ring, check gap in cylinder and refit.		
PHASE B13.		Talk on backlash in gears. Care and lubrication of plain, ball and roller bearings. Gaskets and jointing compounds.	
PHASE C—MAGNETOS AND CARBURETTORS.			
PHASE C1.	MAGNETOS.	Brief description of magnetism and electricity as applied to magneto.	
PHASE C2.	Sectioned magneto should be available for inspection.	Polar inductor type. Brief description giving name, position and function of components. Difference between primary and secondary circuits.	
PHASE C3.	Cadets are to make all these adjustments individually until the required skill is obtained.  Refer A.P. 1374, Vol. 1.	<i>Contact Breaker Assembly.</i> Describe function and operation of C.B. and its relation to time of spark. Method of obtaining, adjusting and checking advance and retard mechanism. Description of twin C.B. Removal and inspection of C.B. assembly. Cleaning, adjusting and locking of points and use of file for truing faces. Inspection, maintenance and replacement of springs. Cleaning and adjustment of cut out switch on twin C.B. Security of switch wire connection, fitting and locking C.B. cover.	

BASIC FITTING.	Practical Work	Lectures & Demonstrations by Instructors.	Books, References & Remarks.
PHASE C4.	<p>Cadets are to make all these adjustments individually until the required skill is obtained.</p> <p>Refer A.P. 1374, Vol. 1.</p>	<p><i>Distributor and Rotor.</i> Function and operation. Removal of screening and distributor block. Inspection and cleaning and checking of gap. Use of dummy distributor and plug gauge.</p> <p>Connection and security of H.T. leads. Purpose of central terminal and carbon brush. Ventilation.</p>	
PHASE C5.	Above remarks apply.	<p><i>Hand starting Magneto.</i> Purpose of H.S. magnetos. How mounted, earthed and driven.</p> <p>Brief description of components. Check for security and cleanliness all carbon brushes and slip rings and C.B. cover and switch connection.</p> <p>Explain connection between H.S. magnetos and main magneto.</p>	
PHASE C6.	Above remarks apply.	<p><i>Impulse Starters.</i> Brief explanation of type Z. Training and lubrication.</p> <p><i>Magnetos General.</i> Lubrication, avoidance of excess Couplings, principle of vernier and other types of couplings. Fitting and checking carbon brushes.</p>	
PHASE C7.	A.P. 1464, Vol. I.	<p><i>Leads :</i> H.T. and L.T. braided and unbraided. Fitting antifray sleeves and terminal ends. Testing leads with lamp and battery for sequence and continuity. Examination of leads for likely defects (A.P. 1464, C.27). Megger test of leads. Ignition harness. Bonding and screening.</p>	
CARBURETTERS.			
PHASE C10.	<p>Cadets are to be given the maximum opportunity to handle and examine all parts of these components, so as to thoroughly understand their operation and also to carry out and observe the effect of the various adjustments.</p>	<p><i>Carburetters.</i> Explanation of function of carburetter in simple form including float chamber mechanism. Brief outline of principles of aero-engine carburetter demonstrating the function of various components. In introducing the slow running, diffuser, power and enrichments jets, it is important that the correct sequence is followed. Explain operation of slow running cut-out.</p>	

BASIC FITTING.	Practical Work.	Lectures & Demonstrations by Instructors.	Books, References & Remarks.
		<p>Demonstrate location of jets, jet wells and drain plugs and method of cleaning, replacing and locking.</p> <p>Purpose of accelerator pump. Care in handling throttle control where accelerator pump is fitted.</p> <p>Carburettor heating and air intake warming devices.</p> <p>Adjustment of Bowden Cables. Stress the importance of airtight joints at all points. Explain necessity for and operation of mixture control with altitude.</p> <p><i>Supercharging.</i> Explanation of the need for supercharging and for the limiting and controlling boost pressure, meaning of "Rated altitude."</p> <p>Explanation of working of supercharger, and the manner in which the 3-stage variable datum A.B.C. controls throttle opening. Fitting and adjusting bell-crank levers and checking end float in ball joints. Inspection for security especially where split pins are employed.</p>	

#### PHASE D—AIR COOLED ENGINES.

PHASE D1.		(General description and lay-out of air cooled engine. Use of special tools and jigs.	
PHASE D2.	Dismantle engine as far as crankcase assembly. (Valve timing need not be disturbed). Lay out and examine components.		
PHASE D3.		<p>Description of parts. Description of piston rings and pistons.</p> <p>Cylinder; valves and valve guides, rocker mechanism</p> <p>Method of removing, re-fitting and securing gudgeon pin.</p>	
PHASE D4.	Clean piston and rings and grooves and check gaps. Test valve spring and replace broken or faulty spring.		

BASIC FITTING.	Practical Work.	Lectures & Demonstrations by Instructors.	Books, References & Remarks.
PHASE D5.		Explain value compensating mechanism. Arrangement of push-rods, tappets and guides—angle of attack. Tappet clearances.	
PHASE D6.	Re-assemble pistons and cylinder, front cover and sump. Replace tappets and guides and push rods and adjust clearances.		
PHASE D7.		Describe supercharger and drive for auxiliaries; explain hand lubrication of supercharger gears. Explain firing order of cylinders in relation to master con - rod and method of timing and synchronising magnetos.	
PHASE D8.		Describe reduction gear and location of air screw shaft and hub. Describe lubrication system including pumps and filters.	
PHASE D9.	<p>SLEEVE VALVE ENGINES.</p> <p>Description of working principal of sleeve valve. Explain timing gear; method of rotating and reciprocating sleeve; junk head. Stress care necessary when turning engine after standing and when removing either cylinder and/or sleeve. Describe method of assembling sleeve crankshaft universal bearing. (Show film demonstrating action of sleeve in opening and closing ports).</p>		

#### PHASE E—LIQUID COOLED ENGINES.

PHASE E1.		General description and layout of liquid cooled engine. Use of special tools and jigs.	
PHASE E2.	Dismantle engine by units as far as crankcase assembly. Lay out and examine components.		
PHASE E3.		Description of pistons, piston rings, big end and little end bearings.	



BASIC FITTING.	Practical Work.	Lectures & Demonstrations by Instructors.	Books, References & Remarks.
PHASE E4— <i>Contd.</i>		Brief description of camshaft assembly and rocker mechanism. Stress the importance of correct sequence in tightening cylinder holding down nuts and use of proper spanner.	
PHASE E4.	Remove and replace one con - rod assembly. Clean piston and rings and check ring gaps. Assemble pistons and rings and replace cylinder blocks. Replace camshaft and rocker assembly.		
PHASE E5.		Explain reduction gear. Describe Supercharger drive, auxiliaries drive, and hand turning gear. Describe method of valve timing and tappet adjustment. Testing and changing valve springs.	
PHASE E6.		Describe Magneto timing and synchronising. Firing order of cylinders. Explain bearings, oil pumps filters and lubrication system generally.	
PHASE E7.		Cooling systems and coolants, pumps and connections. Testing cylinder blocks. Remarks on air-screw hub location.	
PHASE E8.	Dismantle coolant pump re-assemble and adjust gland. Complete assembly of and clean the engine.		

PHASE F—ENGINE COMPONENTS.

PHASE F1.	SWITCHES AND SWITCH WIRING.	General explanation of switches and switch wiring Dual switch wiring.	
PHASE F2.	Fitting and inspection of switches. Earthing of switches. Wiring up switches. Identification of leads. Security of connections. Lamp and battery test of switch wiring.		
PHASE F3.	SPARKING PLUGS.	Construction, function, types and sizes.	

BASIC FITTING	Practical Work.	Lectures & Demonstrations by Instructors.	Books, References & Remarks.
PHASE F4.	<p><i>Dismantling</i> : Use of correct tools.</p> <p><i>Inspection</i> : Likely faults.</p> <p><i>Cleaning</i> : Method with various types ; precautions when cleaning mica insulation ; polishing</p> <p><i>Centre Assembly</i> : <i>Insulation test assembling</i>.</p> <p><i>Gapping</i> : Methods of setting spark gap on various types.</p> <p><i>Testing</i> : Fire precautions. Use of tester. Testing for leaks. Demonstration of faulty and good plugs.</p> <p>Marking after reconditioning. Trainees to do this work on both mica and Sintered Aluminium oxide plugs.</p>		

## SYLLABUS—FLIGHT MECHANIC (AIRFRAME).

*To train airmen to undertake minor routine inspections, cleaning and simple anti-corrosive treatment and simple adjustments on initial equipment airframe.*

### PHASE A. BASIC FITTING.

BASIC FITTING.	Lectures and Demonstrations by Instructors.	Books, References & Remarks.
PHASE A1.	Demonstration in use of and care of tools. Use of marking out tools and methods of marking out. Reading simple drawings.	
PHASE A2.	Types of drills and methods of drilling. Cutting angles and lubricants. Types of screw threads. Taps and dies. Tapping sizes. Fitting and removal of studs.	
PHASE A3.	Locking devices—use of spanners.	
PHASE A4.	Description of metals used in airframe construction. Identification of metals. Types of rivets used and methods of riveting. Riveting faults. Spacing and allowances for riveting. Annealing and normalising light alloys. Treatment of rivets before working.	
PHASE A5.	Development and marking out of sheet metal. Bending allowances. Heat treatment of ferrous metals.	

### PHASE B. PRINCIPLES OF AIRFRAME CONSTRUCTION AND RIGGING.

PHASE B1.	Duties of a rigger. Names and functions of component parts of aircraft. Brief description of types and principles of construction in wood, metal and composite aircraft. Braced girder, stressed skin and geodetic construction.	
PHASE B2.	A.G.S. parts.	
PHASE B3.	Theory of flight (film).	
PHASE B4.	Use of rigging instruments.	
PHASE B5.	Principles of biplane rigging. Trestling—rigging position—care of fabric parts, etc.	
PHASE B6.	Construction and truing of fuselage.	
PHASE B7.	Construction and method of fitting and truing undercarriages.	
PHASE B8.	Construction of centre section, method of truing (internally if necessary), fitting to fuselage and truing.	
PHASE B9.	Construction, fitting and truing of tail unit.	
PHASE B10.	Construction of main planes. Methods of truing internal bracing wires.	
PHASE B11.	Methods of erecting and truing main planes.	
PHASE B12.	Central systems. Methods of adjusting and truing controls.	
PHASE B13.	System of final checks and locking up.	
PHASE B14.	Rigging faults and their correction.	

PHASE C. SPLICING—FABRIC WORK—CARPENTRY.

BASIC FITTING.	Practical Work	Lectures & Demonstrations by Instruction.	Books, References & Remarks.
PHASE C1.		Principles of rope and wire splicing. Type of rope and cable used. Practical demonstration and initial instruction on "eye" splicing.	
PHASE C2.	"Eye" splicing on 25 cwt. cable.		
PHASE C3.	"Eye" and roller splice on 15 cwt. cable.		
PHASE C4.	Test piece in 15 cwt. cable to dead length with thimble and roller splice.		
PHASE C5.		Rope splicing, knots and lashings. Film "knots and lashings" reels 1-3.	
PHASE C6.	Knots and lashings.		
PHASE C7.		Grades of fabric ; preparing jobs for repairs. Stitching straight cuts (inspection holes, etc.) and jagged repairs. Explain covering on the bias. Doping schemes. Treatment of metal components before covering. Care of brushes and containers.	
PHASE C8.	Repair of straight cuts, "L" shaped tears and jagged holes.		
PHASE C9.		Repairing fabric on wing tips and insertion of new panel. Methods of opening up. Stringing.	
PHASE C10.	Exercise in stringing.		
PHASE C11.		Method of spraying dope.	
PHASE C12.	Identification markings. Methods of marking outsizes, etc.		
PHASE C13.		Attachment of fabrics to metal and to plywoods.	
	PHASE D. AIRCRAFT COMPONENTS.		
PHASE D1.	<i>Hydraulic Systems.</i> Principles of hydraulic. Demonstration and description of various parts of system. Outline of Dowty, Lockhead Vickers and Bristol systems. Types of fluid used and necessity of using correct fluid.		



PHASE D. AIRCRAFT COMPONENTS—(contd.)

BASIC FITTING.	Lectures and Demonstrations by Instructors.	Books, Reference & Remarks.
PHASE D2.	Flap and undercarriage indicators. Locking and emergency devices. Common faults. Replacements. Adjustments.	
PHASE D3.	Description of pneumatic systems for operation of brakes, guns, heating duct shutters, etc. Pneumatic brakes—function and maintenance. Working pressures.	
PHASE D4.	Hydraulic brakes. Description. Maintenance priming. Adjustment.	
PHASE D5.	Airframe de-icing equipment. Description, maintenance and repairs.	
PHASE D6.	Vickers. H.P. leg. Principles and maintenance. Inspection—checking and filling. Use of safety lock. Method of dismantling.	
PHASE D7.	Lockhead and Dowty legs. Working principles. Maintenance ailing and testing.	
PHASE D8.	Description of hydraulic and mechanical systems. Maintenance. Method of priming hydraulic system.	
PHASE D9.	Perspex. Method of cleaning—repairs. Replacements (correct drilling clearances).	
PHASE D10.	Floataction gear. Inspection, minor repairs, replacements. Testing and repacking dinghy. Release systems—manual, hydraulic and electric.	
PHASE E. ADVANCED AIRFRAMES.		
<i>Single Engined Aircraft.</i>		
PHASE E1.	Principles of monoplane construction. Methods of dismantling and erection. Equipment tools and instruments used.	
<i>Twin-Engined Aircraft.</i>		
PHASE E2.	Method of dismantling and erecting twin-engined monoplane.	
PHASE E3.	Corrosion. Cause, effect and prevention in both ferrous metals and light alloys.	

PHASE G. HANDLING AND MAINTENANCE OF AIRCRAFT.

<i>Single-Engined Aircraft.</i>		
PHASE G1.	Technical maintenance: Object, organisation, of squadron and flight maintenance orders, Part 1 and 2. Publications: Volumes 1, 2 and 3. Form 700. Travelling F.700. Flight desk. Airframe log book: how divided and how used. Modifications: classes into which divided.	
PHASE G2.	Between flight inspection procedure. Securing of harness. Putting on and releasing parachute. Securing of loose articles in A/C. Refuelling—different types of fuel. Earthing and bending. Oil, lubricants and coolants. Procedure for daily inspections. Cleaning aircraft.	

*Note! Where equipment is not available Workshop practice is to be omitted and demonstration lectures are to be substituted.*

# SYLLABUS.

## INSTRUMENT REPAIRER II.

### INTRODUCTION

*Instrument Repairers, Group III, required for the removal and replacement, minor periodical inspection, maintenance and testing for functioning of all service instruments with the exception of wireless and electrical equipment and cameras.*

NOTE.—Where equipment is not available, Workshop practice is to be omitted and demonstration lectures are to be substituted.

### EDUCATIONAL SYLLABUS.

#### INSTRUMENT REPAIRER II.

##### STAGE A.

BASIC FITTING.	Lectures and Demonstrations by Instructors.	Books, References & Remarks.
STAGE A1.	Introductory Talk. The Atmosphere. Heat—Difference between heat and temperature. Fahrenheit and Centigrade. Scales. Mercury Thermometers. Vapour Pressure Thermometers.	
STAGE A2.	Mechanical Properties. Expansion problems in instruments. Corrosion and its prevention.	
STAGE A3.	The measurement of air speed. The Venturi Principle.	
STAGE A4.	Calculations :—Use of squared paper—application to recording instruments, etc.	
	STAGE B.	
STAGE B1.	Magnetism—the magnet ; the magnetic field, use of iron filings to show magnetic fields ; the earth's magnetic field ; true and magnetic north.	
STAGE B2.	Flight. Forces acting during steady horizontal flight. Meaning of control and stability. Automatic control.	

#### INSTRUMENT REPAIRERS—GROUP II.

##### STAGE A.

BASIC FITTING.	Lectures and Demonstrations by Instructors.	Books, References & Remarks.
STAGE A1 AND A2.	WORKSHOPS SECTION. Introduction to workshop practice. The handling of tools. Marking out and simple filing—reading and interpreting elementary workshop drawings.	
STAGE A3 AND A4.	Further filing practice and Drilling.	
STAGE B1 AND B2.	Simple soldering. Copper pipe bending and belling. The all-metal joint. Bending and belling aluminium and steel tubing. Soldering nipples of Bowden wire cables.	

# INSTRUMENT REPAIRERS.

## TECHNICAL SECTION.

### STAGE A.

#### TECHNICAL INSTRUCTION.

NOTE.—Theoretical instruction on instruments is limited throughout the course to a brief description sufficient to enable the pupil to know the purpose, principle of operation, to be able to determine if serviceable or unserviceable, and the care and maintenance of Instruments as required by the Service.

BASIC FITTING.	Lectures and Demonstrations by Instructors.	Books, References & Remarks.
STAGE A1.	<ul style="list-style-type: none"> <li>(a) A general explanation of the duties of an Instrument Repairer II in the Service.</li> <li>(b) Use of Official Handbooks and Air Publications.</li> <li>(c) The atmosphere and measurement of atmospheric pressure by means of the barometer.</li> <li>(d) The direct type pressure gauge describing the bourden tube and type of connection to pipe line. Its application for : Fuel ; Oil ; Air ; and Brake Pressure Gauges.</li> <li>(e) The transmitting type pressure gauge for fuel and oil pressure, explaining its advantages over the direct type. The method of connection to source of supply. Care of Capillary tubing.</li> <li>(f) The use of the Dead Weight Tester.</li> <li>(g) The Master Thermometer.</li> <li>(h) Air Strut Thermometer and Psychrometer.</li> <li>(i) The transmitting type Air Temperature Thermometer.</li> <li>(j) The Instrument Error Card.</li> <li>(k) The Oil and Radiator Temperature Thermometer.</li> </ul>	
STAGE A2.	<ul style="list-style-type: none"> <li>(a) The Engine Speed Indicator (Mechanical type).</li> <li>(b) Flexible drives, method of examination and installation.</li> <li>(c) The (D.C.) Electric type E.S.1 and its advantages.</li> <li>(d) The care of the E.S.1 Generator.</li> <li>(e) The Windscreen Wiper.</li> <li>(f) Cylinder temperature thermometer. How to check against temperature of the day.</li> <li>(g) Fuel contents Gauge and Flap Gauge, explained by Volts Drop Method.</li> </ul>	
STAGE A3.	<ul style="list-style-type: none"> <li>(a) Further consideration of atmospheric pressure, effects of Temperature, Humidity and Height.</li> <li>(b) The Altimeter Mk. XIII and Mk. XIV.</li> <li>(c) The Height Laws : Isothermal and I.C.A.N.</li> <li>(d) Use of Instrument Error Card.</li> <li>(e) The Rate of Climb Indicator.</li> <li>(f) The Pilot-Static Head. (All types including electrical.)</li> <li>(g) The Air Speed Indicator.</li> <li>(h) Use of Position Error Card.</li> <li>(i) Pipe Line system and methods of testing.</li> </ul>	
STAGE A4.	<ul style="list-style-type: none"> <li>(a) The Boost Gauge.</li> <li>(b) The Pipe Line system and Fuel Trap.</li> <li>(c) Action of Venturi.</li> <li>(d) Action of Pesco Pump, advantage and disadvantage of each of the above.</li> <li>(e) Pipe Lines and Suction Relief Valves.</li> <li>(f) The Gyroscopic Instruments— GYROSCOPIC THEORY. GYRO HORIZON. DIRECTIONAL GYRO. TURN AND BANK INDICATOR.</li> </ul>	

BASIC FITTING.	Lectures and Demonstrations by Instructors.	Books References & Remarks
STAGE A4— <i>Contd.</i>	(g) The blind Flying Panel and Anti-vibrational Mountings. (h) The Fore and Aft Level. (i) Aircraft Clocks and Watches. (j) Bomb Sights, Mks. VII, VIII and IX. (k) The Tail Drift Sight.	
STAGE B1.	STAGE B. (a) The Magnetic Compass. (b) The Need for Corrector Box and deviation Card. (c) The Auto-Bomb Sight and Gyro Azimuth—Advantages over the Mk. VIII Bomb Sight. (d) Oxygen, reasons for use. (e) Method of use. (f) The various tests, replenishing of cylinders. (g) Written examination on all Instruments.	
STAGE B2.	(a) Introduction to the Automatic Controls. (b) The Mk. IA Rudder Plate. (c) Simple actions and controls. (d) Reasons for—" Out of Balance Weight ". " Rotor Balance Nuts ". " Relay Valve ". " Centraliser ". (e) The compression and drying of air. The Supply of Air pressure to the plates. The Pipe Line Layout. (f) The Mk. IA Aileron Plate—general operation. (g) The safety devices and details of all components and maintenance of both plates and accessories.	



# SYLLABUS

## ELECTRICIANS II.

*The aim is primarily to train Electricians II for carrying out minor inspections on aircraft, but it is also necessary to train these tradesmen in simple repair work such as the replacement of wires and the manufacture of simple fittings.*

NOTE.—Where equipment is not available Workshop practice is to be omitted and demonstration lectures are to be substituted.

An elementary knowledge of the fundamental principles of electricity is necessary for intelligent performance of this work. Where necessary a lecture should be given.

### SCHEME OF COURSE.

The course consists of two sections running in parallel.

(a) *Principles.* Lectures and Demonstrations on the fundamental principles involved.

(b) *Practical.* The practical instruction is classified under two headings:

*Individual* which consists of work carried out by each Cadet where possible.

*General* which includes all lectures and demonstrations given collectively, to classes by Instructors. These lectures are to be confined to practical matters and no fundamental principles of theory are to be expounded by Service or Civilian Instructors.

### SUMMARISED SYLLABUS.

PHASE A. BASIC.	Use, care and maintenance of tools. Soldering and timing, fitting, filing, drilling. Manufacture of simple cleats, clips, etc.
PHASE B. WIRING.	Preparing cables. Making up simple circuits. Reading simple wiring diagrams.
PHASE C. CELLS.	Dry Cells. Acid Accumulator. Alkali.
PHASE D.	Instruments (charging), and D.C. Motors and generators. Cut outs (overload and charging).

### PHASE A. BASIC.

Phase	Individual.	General.	Lectures and Demonstrations.	Books, References & Remarks
A1.		Demonstration: Use and care of tools, grinding, drills, screwdrivers, etc. Effect of incorrectly ground screwdrivers, ill fitting spanners, defective pliers, etc.	Nature of an electric current and its production. Meaning of conductors and insulators. Water analogy. Units. The coulomb. The Amp. Ohm volt-. Simple circuits with ammeter and voltmeter.	
A2.		Types of Drills. Simple marking out.		
A3.		Screw threads. Taps and Dies.		
A4.		Use of blow lamp, soldering iron, fluxes, kinds of solder.	Ohms Law. Volts drop in cables with demonstration. Resistances in series and parallel.	

Phase Individual	General	Lectures and Demonstrations	Books, References & Remarks
A5. Soldering practice. Ex. 6. Manufacture of a brass connecting lug. Ex. 7. Sweating a cable end into a lug. Ex. 8.			
PHASE B. WIRING. B1.	Wires, cables and fuses. Types in service and their uses ; necessity for correct preparation of end of cables. (Preventing shorts, etc.).	Faults in simple circuits. Chemical effect of electric current. Simple treatment of chemical action in cells. The primary and secondary cell. Components and Action.	
B2.	Preparing ends of cables and Wires.		
B3.	Simple Wiring Diagrams.		
B4. Wiring of simple circuit with lamps, bells, and switches.		E.M.F. of simple cell. Polarisation and local action. Charging simple lead Acid Acc. Charging of simple Alkaline Acc. Meaning of specific gravity E.M.F. and P.D. Capacity and Amp. Hour rating. Grouping of cells into batteries. Effect on E.M.F. and capacity.	
B5. Wiring of circuits containing :— (i) Voltmeters & ammeters. (ii) Rheostate. (iii) Cut outs. (iv) Individual electrical aircraft components.			
C1. CELLS.	<i>Primary Cells.</i> The Leclanche Cell and its components. Limitation and causes of failure.	Magnetic effect of Electric Current. Elementary Magnetism Polarity. Use of Iron and Steel for magnets. Fields of Permanent Magnets.	
C2. Making up a Leclanche Cell (Wet type). Test voltage on load. Treat for creeping.			

Phase Individual	General	Lectures & Demonstrations	Books, References & Remarks
C3.	<i>Secondary Cells, Acid Accumulators.</i> Use and advantages. Parts and construction. Neutralisation of spilt acid and first aid for acid burns. First aid for Electric Shocks. (See Home Office Factory Posters).	Electromagnetism induced in Straight Conductors and Solenoid. The Electromagnet — effect of (i) Turns, (ii) Current, (iii) Core and Air Gap.	
C4. <i>Acid Accumulators.</i> Testing polarity of charging plant. Testing S.G. Charging, Topping up and general maintenance of acid accumulators. Breaking down Acid. First charge procedure. Fault detection and remedy. Sulphation —overcharging.			
C5.	<i>Alkaline Accumulators.</i> Parts and construction. Electrolyte, preparation and precaution. Characters of the fully charged cell. Charging rates.		
PHASE D. D.C. MOTORS, MOTORS AND GENERATORS.			
D1.	<i>Ammeters, Voltmeters and Meggers.</i> Demonstration of use and handling of service types.	Demonstration of M.I. Instruments. Faraday's principle. R.H. Rule. The Generator Principle. Demonstration of Elementary Generator. Motor Principle. Demonstration of Elementary Motor. L.H. Rule. Back E.M.F.	
D2. Simple continuity testing by lamps and batteries. Insulation testing by megger.			
D3.	<i>Generators (D.C.).</i> Demonstration of parts, demonstration of variation of E.M.F. with speed and Field Current. Demonstration of voltage regulators. Care of bearings.		

Phase	Individual	General	Lectures & Demonstrations	Books, References & Remarks
D4.	Lubrication. Care of commutators. Care of brush gear and brushes. Adjustment of brushes. Wiring of circuit with field rheostat.		Eddy Currents. Moving coil instruments. Power. Watt. KW. Hr. Heating effect of current. (i) Hot Wire Ammeter. (ii) Use of Heaters for guns, pressure head, and in clothing. (iii) Radiators and Lamps.	
D5.		<i>Motors (D.C.).</i> Demonstration of construction and parts. Safety devices. Demonstration of effect on speed of varying field currents and impressed voltage.		



# SYLLABUS. M.T. MECHANICS.

*To train Airmen to undertake maintenance, minor overhaul and repair by replacement of Motor Transport. Airmen of this trade will not be expected to undertake complete overhauls.*

NOTE.—Where equipment is not available Workshop practice is to be omitted and demonstration lectures are to be substituted.

## SUMMARISED SYLLABUS.

PHASE I	... BASIC.
PHASE II.B	... INTERNAL COMBUSTION ENGINE.
PHASE II.C	... CLUTCHES—GEAR BOXES—REAR AXLES.
PHASE II.D	... STEERING FRONT AXLE, AND BRAKES
PHASE II.E	... IGNITION SYSTEMS.
PHASE II.F	... PRACTICAL WORK IN CLASSROOMS.

PHASE I.	General Instruction given on a group or class basis.	Books, References & Remarks.
A1.	BASIC. Introduction to course. Standard of appearance and smartness required. Necessity of maintenance of service vehicles and equipment. The responsibility of the driver mechanic.	
A2.	Demonstration of the use and abuse of tools. Correct method of using spanners in tightening and undoing nuts. Various types of files. Their uses and the correct method of using. Making key for given key way. Correct method of marking out.	
A3.	Demonstration of the use and abuse of drills. Correct use of braces and drilling machines. Elementary use of reamers for cleaning bushes. Use of adjustable reamers. Importance of careful operation and care of same. How to adjust.	
A4.	Use of taps and dies. Elementary explanation of different types of threads. Demonstration of how to clean and lengthen thread on given rod.	
A5.	Simple demonstration in the use of rivets. Use of chisel. How cutting edge of chisel should be ground. Cutting metal to given size.	
A6.	Soldering. Use of soldering iron, different types of metals and fluxes required. Procedure before soldering. Precautions before attempting to solder a petrol tank.	

Individual Instruction.	General Instruction given on a group or class basis.	Books, References & Remarks.
PHASE II.B. INTERNAL COMBUSTION ENGINE. B1.	Introduction. "The Otto" or 4-stroke cycle. Compression ratio. Appropriate films. Explanation of the terms: pinking, knocking, pre-ignition and back firing. Constructional details of engine. Valves — tappets — cam shaft — crankshaft — cylinders — piston — piston rings — connecting rods. Simple explanation of small and big end bearing.	

Individual Instruction.	General Instruction given on a group or class basis.	Books, References & Remarks.
B2. Practice in valve and ignition timing.	What is meant by valve and ignition timing. Demonstration of how carried out.	
B3.	Correct starting ; warming up, etc., with view to minimising wear. Use and abuse of enriching devices. Engine lubrication. Importance of oiling system. Elementary explanation of splash system — gear driven pump. Pressure gauge. Care and object of oil filters. Importance of changing oil.	
B4.	Engine cooling systems. Simple explanation of Radiator - fan - water pump thermostat. Demonstration of water circulation.	
B5.	Carburation. Introduction. Principle of carburettors. Dismantle modern types and explain construction, give methods of removing float and jets. Slow running device.	
B6.	Fuel systems. Elementary explanation of petrol pumps, Dismantle pump and demonstrate various components. Possible faults and their cures.	
B7.	Fuel line and feed. Auto Vac, gravity feed. Petrol gauges. Filters and their uses. Possible stoppages in fuel supply and their causes.	

#### PHASE II.C. CLUTCHES, GEAR BOXES AND REAR AXLES.

C1.	Simple explanation of clutch. Single plate—multi plate. Importance of clutch pedal, clearance, thrust release bearings.	
C2.	Causes of clutch slip. Setting clutch fingers. Result of driving with foot pressing on clutch pedal. Lubrication points on clutch assembly.	
C3.	Gear boxes. Introduction. Demonstration of action of main and lay shafts—sliding gears, change speed mechanism. Elementary explanation of synchromesh. Importance of lubrication. Correct types of oil level.	

Individual Instruction.	General Instruction given on a group or class basis.	Books, References & Remarks.
C4.	Universal joints. Hardy Spicer coupling. Propellor shaft. Importance of these units being kept tight and lubricated.	
C5.	Rear axle. Introduction. Simple explanation of the differential gear. Demonstration of operation of crown and bevel. Importance of lubrication of correct type.	

#### PHASE II.D. STEERING FRONT AXLE AND BRAKES.

D1.	Steering. Introduction. Explanation of Ackerman System. Steering gear, track rod and methods of adjusting. Importance of keeping all moving parts lubricated.	
D2.	Front axle beams and stub axles. Explanation of how stub axles are fitted to axle beam. Necessity of lubrication. Wheel, hubs and bearings. Lubrication of same.	
D3.	Frames and suspension. Introduction. Springs—Shock absorbers. Importance of keeping shock absorbers in correct adjustment.	
D4.	Brakes. Introduction. Hydraulic systems. Explanation of operation and adjustment. Importance of constant examination of brake gear. Lubrication points.	

#### PHASE III.F. PRACTICAL WORK IN CLASSROOMS.

F1. Practice in valve grinding. Adjusting tappets and fitting cylinder head gasket.	Decarbonising. Valve grinding. Adjusting and setting tappets. Removing and fitting cylinder head gaskets, and manifold gaskets. Correct method of cleaning valve pockets without damaging valve seats. Cleaning valve stems and guides.	
F2. Practice in dismantling carburettor. Practice in timing ignition, and setting contact points.	Dismantle and explain the function of the carburettor and fuel pump. Correct method of timing ignition. Correct setting of contact points.	
F3. Practice in packing water pump gland. Fitting rubber hose connection to radiator and cylinder.	Method of re-packing water pump gland. Fix rubber hose connection to radiator and cylinder.	

Individual Instruction	General Instruction given on a group or class basis	Books, References & Remarks
F4. Remove and refit one front and one rear spring with axle in position. Use of spring spreader and method of servicing springs. Essential tightness of all holding down bolts.		
F5. Readjust the clutch fingers on a vehicle with slipping clutch. Reset pedal clearance. Explanation of clutch stop. Trainee to adjust same.		
F6. Remove and refit a flexible coupling fitted to propeller shaft. Remove and refit a universal joint.		
F7. Jacking system. Remove all wheels and hubs on a vehicle fitted with rod operated brakes. Method of roughing up brake linings. Reassemble and adjust brakes.		
F8. Bleed a hydraulic brake system. Readjust and balance brakes.		



## BIBLIOGRAPHY

### ADMINISTRATION AND GENERAL TRAINING.

#### OFFICIAL PUBLICATIONS.

The following official publications will be issued :—

A.P. 125	A short History of the R.A.F.
A.P. 818A	Part I R.A.F. Drill.
	War Office P.T. Tables (1 to 12) as used by R.A.F. Units.
A.P. 1081A	R.A.F. Pocket Book.
A.P. 1764	Aircraft (Recognition) Wallet.
A.D. 1340 —	Aircraft (Recognition) Wall Charts.
1343 —	British, German and Italian Aircraft.

The following unofficial Handbook will be issued :—

The Sky's the Limit—J. M. Spaight.

LECTURE NOTES will be issued covering the whole of administration and general training.

GENERAL.—Any matters on which a particular Squadron may desire amplification or clarification should be taken up directly with the Officer-in-Charge Training, Headquarters, Air Training Corps.

## BIBLIOGRAPHY

### INITIAL TRAINING WING AND TECHNICAL TRAINING.

#### OFFICIAL PUBLICATIONS.

The following Official Handbooks will be issued :—

A.P. 129	R.A.F. Flying Training Manual.
A.P. 1081	R.A.F. Pocket Book.
A.P. 1234	Manual of Air Navigation, Vol. I.
A.P. 1762	Electric and Radio Notes for Wireless Operators.
A.D. 1136	Air Diagram Tutor Maintenance.
A.P. 1764	Aircraft (Recognition) Wallet.
A.D. 1340 —	Aircraft (Recognition) Wall Charts.
1343 —	British, German and Italian Aircraft.
A.P. 1107	Manual of Rigging for Aircraft, 3rd Ed.
A.P. 850	A short course in elementary Meteorology.
A.P. 897	Meteorological Glossary, 2nd Ed.

The following Unofficial Handbook will be issued :—

The Sky's the Limit—J. M. Spaight.

LECTURE NOTES.—Lecture notes on each subject will be issued.

GENERAL.—Any matters on which a particular Squadron may desire amplification or clarification should be taken up directly with the Officer-in-Charge Training, Headquarters, Air Training Corps.

## BIBLIOGRAPHY

<i>Title.</i>	<i>Publisher.</i>
Aero Engines for Pilots and Ground Engineers.	Pitman.
Aeronautical Meteorology.	"
Aeroplane Structure.	"
Aircraft Design, Vols. I and II.	Chapman & Hall.
Air Navigation.	Pitman.
Aero Engines ("C" Licence).	"
Aero Engines ("D" Licence).	"
Electricity in Aircraft.	"
Elementary Handbook for Wireless Operators.	"
Elementary Practical Mathematics, Books I and II.	"
Flight without Formula.	"
How to Find Your Way in the Air.	"
Inspection of Aircraft after Overhaul.	"
Instruments.	"
Ice Accretion on Aircraft.	"
Mechanics of Flight.	"
Modern Aviation Engines.	Chapman & Hall.
Mathematics for Engineers.	"
Rigging, Maintenance and Inspection of Aircraft.	Pitman.

NOTE.—While all the above books are worthy of a place in all A.T.C. Squadron libraries in the interests of economy, care should be taken in selecting those books necessary for training in the trades taught in the Squadron concerned.

#### JOURNALS.

Flight.  
The Aeroplane.  
The Aeroplane Spotter.

## A.T.C. HEADQUARTERS PERSONNEL.

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All communications on matters referring to Air Training Corps should be sent over the signature of O.C. Squadrons, and are to be addressed to :—

THE COMMANDANT,  
Headquarters Air Training Corps,  
Montrose House,  
Gordon Avenue,  
Stanmore, Mx.

Telephone : Stanmore 117.

Letters should be marked as follows :—

Training	Air . 2.
All personal matters	" P "
All accounting matters	Accts.
All uniforms and equipment	Eq.

Under no circumstances should enquiries, applications or any correspondence be addressed to the Air Ministry.